MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

TIC3151 / TES3111 – ARTIFICIAL INTELLIGENCE

(All sections / Groups)

28TH OCTOBER 2017
9.00 A.M – 11.00 A.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 3 pages with 4 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

(a) One of the schools of thought defines Artificial Intelligence (AI) as system/agent that can act rationally. [4 marks]

(i) What is the difficulty faced by AI researchers when they try to formulate the agent function?

(ii) Provide an example to justify your answer in Question 1(a)(i).

(b) Define the following properties of a task environment. [3 marks]

(i) Episodic environment

(ii) Sequential environment

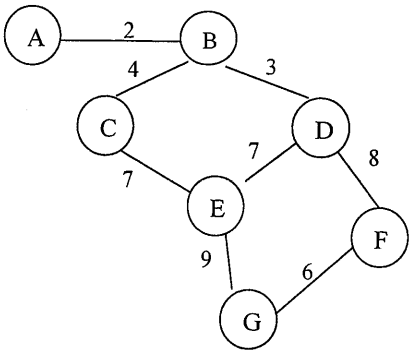
(iii) Fully observable environment

(c) Describe an example of a task environment that fulfills the combination of **ALL** three properties in Question 1(b). [3 marks]

QUESTION 2

Given below is a graph with distances between pairs of cities in kilometre (km). A table containing the straight-line distance heuristic values is also provided. The initial state is in City A and the goal is to reach City G.

Straight-line distance to Y	
A	10
B	8
C	6
D	5
E	3
F	4
G	0



(a) Draw the search tree using *uniform-cost* search algorithm. Avoid repeated nodes. Label the nodes with appropriate costs. State the solution path and path cost. [3.5 marks]

(b) Draw the search tree using *iterative deepening A** search algorithm. Avoid repeated nodes. For each iteration, show how nodes within the search tree are visited and expanded step by step when the agent applies *iterative deepening A** search algorithm to find an optimal solution path. State the solution path and path cost. [6.5 marks]

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QUESTION 3

(a) Given the following English sentences:

All boys own motorcycle. Everybody who owns motorcycle will also own bicycle. Suzuki is a motorcycle and it is expensive. Anything which is expensive is either stylish or lightweight. There is no motorcycle that is lightweight. Jane has not own anything that is stylish.

(i) Convert the above sentences to first-order logic statements and Conjunctive Normal Form (CNF). [3 marks]

(ii) Apply resolution to prove that *Jane is not a boy.* [5 marks]

(b) Convert the following sentence to propositional logic. Prove that the sentence is either valid or satisfiable. [2 marks]

You can buy ice-cream only if you have enough money or you are not having toothache.

QUESTION 4

(a) The table below shows the food preferences of a group of students in Artificial Intelligence class. The goal attribute is ***Gender***.

Main-course	Drinks	Appetizer	Soup	Gender
Noodle	Milo	Croissant	Pumpkin	Female
Noodle	Tea	Salad	Mushroom	Male
Nasi-lemak	Coke	Salad	Mushroom	Male
Toast	Milo	Spring-roll	Pumpkin	Female
Nasi-lemak	Tea	Spring-roll	Pumpkin	Male
Nasi-lemak	Milo	Spring-roll	Pumpkin	Male
Noodle	Coke	Salad	Pumpkin	Female
Noodle	Coke	Croissant	Mushroom	Male

(i) Using the ID3 decision tree algorithm, identify the root of the decision tree. [3 marks]

(ii) Based on your answer in Question 4 (a) (i), continue to build the decision tree using ID3 algorithm. Draw the resulting decision tree. [3 marks]

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(iii) Based on your answer in Question 4 (a) (ii), is there any attribute that is not selected to be part of the decision tree ? If yes, please specify.[2 marks]

(b) Is ID3 decision tree learning considered as supervised or unsupervised learning? Justify your answer. [2 marks]

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